Docket No. 57934.US/2310.0

APPLICATION

of

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for

LETTERS PATENT OF THE UNITED STATES

for

ELECTRIC FENCE INSULATORS

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ELECTRIC FENCE INSULATORS

FIELD OF THE INVENTION

This invention relates generally to insulators for electric fences. More particularly, this invention relates to insulators mountable to a support structure for supporting and maintaining a pair of electric fence wires in a spaced apart relationship.

BACKGROUND AND SUMMARY OF THE INVENTION

Electric fences of the type utilizing a ground wire, a current carrying wire, and a source of electrical current are known. The ground wire and the current carrying wire are conventionally spaced apart and positioned generally parallel to one another using separate insulator devices. The spacing between the wires are such that an animal coming in contact with the fence will contact both wires. This creates a current path to complete the circuit such that the animal receives a mild electrical shock.

The wires are often suspended or supported from a support structure, such as a board, or a metal or wood post. It is important to electrically isolate or insulate the wires from the support structure and to prevent the ground wire and the current carrying wire from contacting one another. It is also important to maintain the wires in a desired spaced relationship so that an animal contacting the fence will be likely to simultaneously contact both wires so that a shock is received by the animal.

Separate insulators have been used to support the spaced apart wires due to the need to electrically isolate the wires from one another. The use of separate insulators, however, is cumbersome and desires improvement.

With regard to the foregoing, the present invention is directed to a fence insulator for maintaining a pair of fence wires in a desired common plane and spaced a desired distance apart.

In a preferred embodiment, the insulator includes a body of molded plastic construction mountable to a support and including a pair of spaced apart sidewalls connected by a connecting wall.

A first pair of aligned grooves are defined across the connecting wall and a first retention member is positioned adjacent the first pair of aligned grooves and configured for receiving one of the wires underneath a portion thereof.

A second pair of aligned grooves is also defined across the connecting wall and spaced apart from and substantially parallel to the first pair of aligned grooves. A second retention member is positioned adjacent the second pair of aligned grooves and configured for receiving one of the wires underneath a portion thereof.

One of the wires is positionable underneath the first retention member and within the first pair of aligned grooves and the other one of the wires is positionable underneath the second retention member and within the second pair of aligned grooves.

In one preferred embodiment, the retention members are pairs of oppositely disposed fingers located adjacent the connecting wall and spaced interior the pairs of grooves. In another embodiment, the retention members are flexible tabs defined adjacent the connecting wall with underlying cutouts defined within the connecting wall.

In another aspect, the fence insulator includes an elongate body of molded plastic construction mountable to a support and including a wire mounting face. A first retention member is positioned adjacent the wire mounting face and configured for receiving one of the wires underneath a portion thereof. A second retention member is configured for receiving the other one of the wires underneath a portion thereof and is located adjacent the wire mounting face and longitudinally spaced apart from the first retention member.

In still another aspect, the invention relates to a fence insulator for installation at corners of a fence or other locations where first and second spaced apart fence wires undergo an abrupt change of direction.

In a preferred embodiment, the insulator includes an elongate body of molded plastic construction mountable to a support and including a wire mounting face. A first rigid tab is positioned adjacent the wire mounting face and has an opening for passage of the first wire and a curved closed end configured for bearing against the first wire to provide a radius for the first wire to curve around to reduce stresses on the first wire as it undergoes a relatively abrupt change of direction. A second rigid tab is

positioned adjacent the wire mounting face longitudinally spaced apart from the first tab. The second tab has an opening for passage of the second wire and a curved closed end configured for bearing against the second wire to provide a radius for the second wire to curve around to reduce stresses on the second wire as it undergoes a relatively abrupt change of direction.

In yet another aspect, the invention relates to a fence system which preferably includes a current carrying wire connectable to a source of electric current, a ground wire, and a unitary insulator configured to receive the current carrying wire and the ground wire and to maintain the wires in a spaced apart and electrically isolated orientation.

BRIEF DESCRIPTION OF THE DRAWINGS

Further features of preferred embodiments of the invention will become apparent by reference to the detailed description of preferred embodiments when considered in conjunction with the figures, which are not to scale, wherein like reference numbers, indicate like elements through the several views, and wherein,

FIG.1A is a perspective view of an insulator in accordance with a preferred embodiment of the invention. FIGS. 1B-1D are front, top, and left side plan views, respectively, of the insulator of FIG. 1A.

FIG. 2A is a perspective view of an insulator in accordance with another embodiment of the invention. FIGS. 2B-2D are front, top, and left side plan views, respectively, of the insulator of FIG. 2A.

FIG. 3A is a perspective view of an insulator in accordance with yet another embodiment of the invention. FIGS. 3B-3D are top, end, and side plan views, respectively, of the insulator of FIG. 3A.

FIG. 4A is a perspective view of an insulator in accordance with still another embodiment of the invention. FIGS. 4B-4D are top, side, and end plan views, respectively, of the insulator of FIG. 4A.

DETAILED DESCRIPTION

FIGS. 1A-1D

With reference to FIGS. 1A-1D, there is shown a fence insulator **10** in accordance with a preferred embodiment of the invention. The insulator 10 is shown in FIG. 1A having a ground wire **12** and current carrying wire **14** installed thereon adjacent a mounting face thereof to maintain the wires 12 and 14 in a desired spaced apart relationship. Heretofore, separate insulators have been used with electric fences of the type having a ground wire and a current carrying wire. That is, on a post, a first insulator is used to support the current carrying wire, while a second insulator is used to support the ground wire. The present invention now enables the use of a single or unitary insulator on a post or support to support both the current carrying wire and the ground wire to maintain them separate and in electrical isolation from one another.

The insulator 10 is preferably of one-piece molded plastic construction and configured to be mounted to a vertically oriented metal or wood post. For example, the insulator 10 includes arms **16** which extend from rear edges **18** and **20**

of a main body **21** of the insulator 10. The arms 16 are spaced and configured to snap fit around a metal post of the type commonly used for fencing.

The insulator 10 also preferably includes an upper mounting member **22** having an aperture **23** and a lower mounting member **24** having aperture **25**. Fasteners, such as screws or the like may be passed through the apertures 23 and 25 for mounting the insulator 10 to a support such as a wood post. The mounting members 22 and 24 are preferably substantially planar extensions from the main body 21 of the insulator 10.

The body 21 has a hollow interior defined within a pair of spaced apart sidewalls **26** and **28** connected by a connecting wall or wire mounting face having first and second portions shown as walls **30** and **32** separated by a discontinuity such as gap **34** corresponding to cutaway portions of the sidewalls 26 and 28. The gap 34 is aesthetically pleasing and advantageously reduces the likelihood of electrical communication, e.g., the formation of a carbon arc trail or the like, between the wires. Similarly, cutouts or windows **35** are preferably provided on the sidewalls 26 and 28 to reduce the likelihood of electrical communication and to reduce weight and material costs.

An end wall **36** is located at one end of the body 21 adjacent to and generally perpendicular to the sidewalls 26, 28 and the connecting wall 30. An end wall **38** is likewise located at the opposite end of the body 21.

The junctures between the sidewalls 26, 28 and the connecting walls 30 and 32 are preferably beveled or rounded to define edges **40a** and **40b** adjacent the connecting wall 30, and edges **42a** and **42b** adjacent the connecting wall 32. Aligned grooves **44a** and **44b** are defined across the edges 40a and 40b for receiving the wire 12. Likewise, aligned grooves **46a** and **46b** are defined across the edges 42a and 42b for receiving the wire 14. The grooves 44a-46b are preferably closely adjacent the end walls 36 and 38, respectively.

A pair of oppositely disposed fingers **48a** and **48b** are defined adjacent the connecting wall 30 to retain the wire 12 within the grooves 44a and 44b. The finger 48a is preferably spaced slightly interior the groove 44a and extends from adjacent the end wall 36 to a location past, e.g., below the groove 44a in the context of the depicted orientation. The finger 48b is preferably spaced slightly interior the groove 44b and extends from a location below the groove 44b to a point just above the groove 44b. Likewise, a pair of oppositely disposed fingers **50a** and **50b** are defined adjacent the connecting wall 32 and similarly positioned to retain the wire 14 within the grooves 46a and 46b.

To provide an electric fence, each insulator 10 is installed on a support, such as a post, by use of the arms 16 or the mounting members 22 and 24 in conjunction with fasteners. The insulators are preferably generally aligned in a common horizontal plane. The wires 12 and 14 are installed on the insulators as in the

manner shown in FIG. 1A, by manipulating the wire 12 through the gap between the fingers 48a, 48b, and the wire 14 through the gap between the fingers 50a, 50b.

After the wires are installed on all of the insulators, the wires are tightened to a desired tension, with the wire 12 seated within the grooves 44a, 44b of the insulators 10, and the wire 14 seated within the grooves 46a, 46b of the insulators 10. The fingers 48a, 48b cooperate to retain the wire 12 within the grooves 44a, 44b, and the fingers 50a, 50b cooperate to retain the wire 14 within the grooves 46a, 46b.

FIGS. 2A-2D

With reference now to FIGS 2A-2D, there is shown another embodiment of an insulator **60**. The insulator 60 is shown in FIG. 2A having a ground wire **62** and current carrying wire **64** installed thereon to maintain the wires 62 and 64 in a desired spaced apart relationship.

The insulator 60 is preferably of one-piece molded plastic construction and configured to be mounted to a vertically oriented metal or wood post. The insulator 60 includes arms **66** which extend from rear edges **68** and **70** of a main body **71** of the insulator 60. The arms 66 are spaced and configured to snap fit around a metal fence post.

The insulator 60 also preferably includes an upper mounting member **72** having an aperture **73** and a lower mounting member **74** having aperture **75**. Fasteners, such as screws or the like may be passed through the apertures 73 and 75 for mounting the insulator 60 to a support such as a wood post. The mounting members 72 and 74

are preferably substantially planar extensions from the main body 71 of the insulator 60.

The body 71 has a hollow interior defined within a pair of spaced apart sidewalls **76** and **78** connected by a connecting wall **80**. Windows **85** are provided on the sidewalls 76 and 78 to reduce weight and material costs. An end wall **86** is located at one end of the body 71 adjacent to and generally perpendicular to the sidewalls 76, 78 and one end of the connecting wall 80. An end wall **88** is likewise located at the opposite end of the body 71.

The junctures between the sidewalls 76, 78 and the connecting wall 80 are preferably rounded to define edges **90a** and **90b** adjacent the connecting wall 80. Aligned grooves **94a** and **94b** are defined across the edges 90a and 90b at one end of connecting wall 80 for receiving the wire 62. Aligned grooves **96a** and **96b** are defined across the edges 90a and 90b at the opposite end of the connecting wall 80 for receiving the wire 64. The grooves 94a-96b are preferably closely adjacent the end walls 86 and 88, respectively.

A flexible tab **98a** is defined adjacent the connecting wall 80 and a corresponding and underlying cutout **98b** is defined within the connecting wall 80 to retain the wire 62 within the grooves 94a and 94b. Likewise, a tab **100a** and cutout **100b** are similarly defined and positioned to retain the wire 64 within the grooves 96a

and 96b. The tabs 98a and 100a preferably both open toward the middle of the connecting wall 80.

To provide an electric fence, each insulator 60 is installed on a support, such as a post, by use of the arms 66 or the mounting members 72 and 74 in conjunction with fasteners. The insulators are preferably generally aligned in a common horizontal plane. The wires 62 and 64 are installed on the insulators as in the manner shown in FIG. 2A, by flexing the tab 98a in a direction away from the connecting wall 80 and passing the wire 62 underneath the tab 98a to locate it across the cutout 98b. Similarly, the tab 100a is flexed and the wire 64 passed underneath to locate it across the cutout 100b

After the wires are installed on all of the insulators, the wires are tightened to a desired tension, with the wire 62 seated within the grooves 94a, 94b of the insulators 60, and the wire 64 seated within the grooves 96a, 96b of the insulators 60. The tab 98a and cutout 98b cooperate to retain the wire 62 within the grooves 94a, 94b, and the tab 100a and cutout 100b cooperate to retain the wire 64 within the grooves 96a, 96b.

FIGS. 3A-3D

Turning now to FIGS. 3A-3D, there is shown yet another embodiment of an insulator **110.** The insulator 110 is shown in FIG. 3A having a ground wire **112** and current carrying wire **114** installed thereon to maintain the wires 112 and114 in a desired spaced apart relationship.

The previous embodiments of insulators 10 and 60 are preferably utilized for mounting of wires on posts and other generally vertical supports. The insulator 110 is particularly configured and preferably utilized for mounting of wires on boards and other generally horizontal supports. This insulator 110 is thus particularly suitable for providing electric fences for use in thwarting birds from perching on balconies and the like.

The insulator 110 preferably includes a main body **121**, with a first mounting member **122** having an aperture **123** and a second mounting member **124** having aperture **125**. Fasteners, such as screws or the like may be passed through the apertures123 and 125 for mounting the insulator 110 to a support such as a board. The mounting members 122 and 124 are preferably substantially planar extensions from the main body 121 of the insulator 110.

The body 121 has a hollow interior defined within a pair of spaced apart sidewalls **126** and **128** connected by a connecting wall **130**. Grooves **135** are provided on the sidewalls 126 and 128 to reduce the likelihood of electrical communication between the wires. An end wall **136** is located at one end of the body 121 adjacent to and generally perpendicular to the sidewalls 126, 128 and one end of the connecting wall 130. An end wall **138** is likewise located at the opposite end of the body 121.

The junctures between the sidewalls 126, 128 and the connecting wall 130 are preferably rounded to define edges **140a** and **140b** adjacent the connecting wall 130. Aligned grooves **144a** and **144b** are defined across the edges 140a and 140b at

one end of connecting wall 130 for receiving the wire 112. Aligned grooves **146a** and **146b** are defined across the edges 140a and 140b at the opposite end of the connecting wall 130 for receiving the wire 114. The grooves 144a-146b are preferably closely adjacent the end walls 136 and 138, respectively.

A flexible tab **148a** is defined adjacent the connecting wall 130 and a corresponding and underlying cutout **148b** is defined within the connecting wall 130 to retain the wire 112 within the grooves 144a and 144b. Likewise, a tab **150a** and cutout **150b** are similarly defined and positioned to retain the wire 114 within the grooves 146a and 146b. The tabs 148a and 150a preferably both open toward the middle of the connecting wall 130.

To provide an electric fence, each insulator 110 is installed on a support, such as a board, window ledge, rooftop, and the like, by use of the mounting members 122 and 124 in conjunction with fasteners. The insulators are preferably generally aligned in a common plane, such as along the railing of a balcony. The wires 112 and 114 are installed on the insulators as in the manner shown in FIG. 3A, by flexing the tab 148a in a direction away from the connecting wall 130 and passing the wire 112 underneath the tab 148a to locate it across the cutout 148b. Similarly, the tab 150a is flexed and the wire 114 passed underneath to locate it across the cutout 150b

After the wires are installed on all of the insulators, the wires are tightened to a desired tension, with the wire 112 seated within the grooves 144a, 144b of the insulators 110, and the wire 114 seated within the grooves 146a, 146b of the

insulators 110. The tab 148a and cutout 148b cooperate to retain the wire 112 within the grooves 114a, 114b, and the tab 150a and cutout 150b cooperate to retain the wire 114 within the grooves 146a, 146b.

FIGS. 4A-4D

With reference now to FIGS. 4A-4D, there is shown another embodiment of an insulator **160** that is particularly configured and preferably utilized for mounting of wires on boards and other generally horizontal supports. The insulator 160 is particularly configured for installations at corners of the fence or other locations where the direction of the wire is to undergo a relatively abrupt change of direction.

In this regard, insulator 160 is shown in FIG. 4A having a ground wire **162** and current carrying wire **164** installed thereon to maintain the wires 162 and164 in a desired spaced apart relationship as the directions of the wires undergoes a relatively abrupt change. Insulators, such as the previously described insulators 110, are preferably used to support the wires at locations spaced apart from and on either side of the insulator 160.

The insulator 160 preferably includes a main body **171**, with a first mounting member **172** having an aperture **173** and a second mounting member **174** having aperture **175**. Fasteners, such as screws or the like may be passed through the apertures173 and 175 for mounting the insulator 160 to a support such as a board. The mounting members 172 and 174 are preferably substantially planar extensions from the main body 171 of the insulator 160.

The body 171 has a hollow interior defined within a pair of spaced apart sidewalls **176** and **178** connected by a connecting wall **180**. Cutouts **185** are provided on the sidewalls 176 and 178 to reduce the likelihood of electrical communication between the wires. An end wall **186** is located at one end of the body 171 adjacent to and generally perpendicular to the sidewalls 176, 178 and one end of the connecting wall 180. An end wall **188** is likewise located at the opposite end of the body 171.

The junctures between the sidewalls 176, 178 and the connecting wall 180 are preferably rounded to define edges **190a** and **190b** adjacent the connecting wall 180. A rigid tab **192a** is defined adjacent the connecting wall 180 and the end 186 and a corresponding and underlying cutout **192b** is defined within the connecting wall 180. The tab 192a includes a projection **193** on a surface thereof facing the cutout 192b. Likewise, a rigid tab **194a** having a projection **195**, and cutout **194b** are similarly defined adjacent the opposite end 188. Both of the tabs 192a and 194a preferably open toward a common end, such as the end 186, so that the wires 162 and 164 bear against closed ends **192c** and **194c** of the rigid tabs 192a and 194a. The closed ends 192c and 194c are preferably curved to provide a radius for the wires to curve around to reduce stresses on the wires as they undergo a relatively abrupt change of direction. The cutouts are preferred to facilitate passage of the wires underneath the projections 193, 195 when installing the wires 162, 164 on the insulator 160.

To provide an electric fence, each insulator 160 is installed on a support, such as a board, by use of the mounting members 172 and 174 in conjunction with

fasteners. As noted above, the insulator 160 is particularly configured for installations at corners of the fence or other locations where the direction of the wire is to undergo a relatively abrupt change of direction, and is particularly configured for use in conjunction with the insulators 110 described previously in connection with FIGS. 3A-3D. The wires 162 and 164 are installed on the insulator 160 as in the manner shown in FIG. 4A, by urging them past the projections 193 and 195 so that the wires are positioned underneath the tabs and trapped between the projections and the closed ends of the tabs. The projections help to maintain the wires underneath the tabs until the wires are tightened. The wires are then tensioned, with the tension serving to retain the wires underneath the tabs.

The foregoing description of certain exemplary embodiments of the present invention has been provided for purposes of illustration only, and it is understood that numerous modifications or alterations may be made in and to the illustrated embodiments without departing from the spirit and scope of the invention as defined in the following claims.